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the **Large Hadron Collider** project

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Interface Specification

INNER TRIPLET CORRECTOR MCBX/MCBXA (INTERIM)

Abstract

MCBX and MCBXA corrector packages are mated with MQXA and MQXB quadrupoles in the LMQXA, LMQXB, and LMQXC assemblies. This specification codifies the envelope and attachments which constrain the MCBX deliverable such that the attachment can be completed.

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History of Changes

Rev. No.	***Date***	***Pages***	***Description of Changes***
0.0-draft	2000-15-12	All	First draft
0.1-draft		4, 5	On page 3 375mm was 372 mm
			On page 4, the scribe line has been noted as the reference to be used in case of discrepancy
0.2-draft	2001-09-05		Revised Figure 1. Updated drawings references.
0.3-draft	2001-11-27		Fig.1 updated.

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1. INTRODUCTION

Each inner triplet of LHC [1] is assembled from a set of components, including the main quadrupole elements MQXA and MQXB, and corrector elements MCBX, MCBXA, and MQSXA (figure 1). The MCBX, MCBXA and MQSXA corrector packages are incorporated into the LMQX helium vessels, and operate in a 1.9K helium bath that surrounds the corrector and is contained by a separate cylinder.

The MCBXA corrector consists of an MCBX assembly [2], with 2 additional windings inserted into the bore or the dipole.

The correctors are procured by CERN, and delivered fully tested to Fermilab for final assembly with the main quadrupoles.

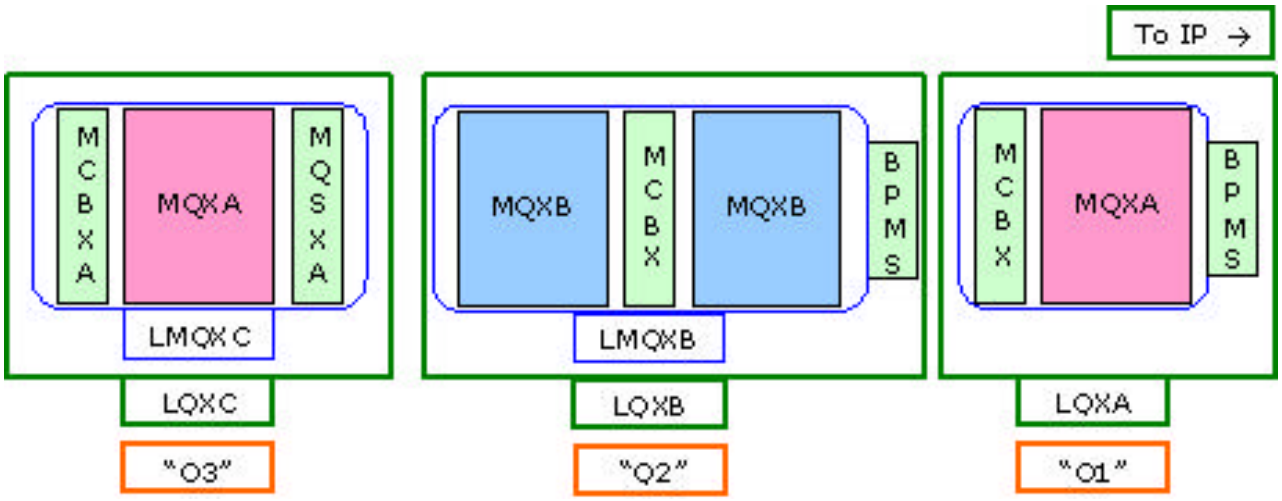

Figure 1. Layout of one side of an interaction point showing assembly packages

2. MCBX / MCBXA INTERFACES

2.1 MECHANICAL

The MCBX (or MCBXA) corrector package has a mechanical envelope and mass as defined in [3]. This envelope is consistent with the volume provided in the LMQX assemblies, and the flange shown on the non-lead end of the corrector outer cylinder mates with the attachment element which will be used to connect the corrector to either the LMQXA, LMQXB, or LMQXC assemblies.

2.2 ELECTRICAL

The MCBX is provided to Fermilab with 4 600A leads extending from the lead end of the package; the MCBXA is provided to Fermilab with 4 600A leads for the dipole layers and 4 120A leads for the additional layers. CERN will provide the leads out to the current lead

mounting plate attached to each unit. The leads are labeled A and B, in accordance with CERN standard [4].

Each layer of the correctors come with a single voltage tap attached to the A lead. The corrector unit will be delivered with 10m of 26 gauge wire for each of these taps [5].

There are no temperature sensors or quench heaters associated with these units.

2.3 ALIGNMENT

Alignment information for the dipole layers is transmitted in rotation by use of holes located in the end of the dipole coils, and visible on the end of the corrector package. For position of the axis, the outer cylinder of the corrector element is concentric with the beam axis. In the case of the MCBXA, CERN aligns the extra layers with respect to the dipole layers.

In addition to the dowel holes in the end of the dipole coils, a scribe line will be located on the exterior surface of the cylinder to serve as a rotational alignment mark. In instances where the alignment the holes and of the scribe line differ, the scribe line will be used as the reference mark.

3. REFERENCES

[1] INNER TRIPLET SYSTEMS AT IR1, 2, 5, AND 8, CERN Functional Specification LHC-LQX-ES-0001.00

[2] TECHNICAL SPECIFICATION FOR THE SUPPLY OF SUPERCONDUCTING DIPOLE CORRECTOR MAGNETS MCBX FOR THE INNER TRIPLETS OF THE LARGE HADRON COLLIDER, CERN Specification LHC-MCBX-CI-0001

[3] CERN drawing LHCMCBXA0003

[4] LHC MAGNET POLARITIES, CERN Specification LHC-DC-ES-0001

[5] INSTRUMENTATION WIRES, CONNECTION TECHNIQUES AND FEEDTHROUGHS FOR THE LHC CRYOMAGNETS AND THE QRL, CERN Specification LHC-QI-ES-0001